

WHAT IS CLAIMED IS:

1. A process comprising:

defining an arrangement of four or more different processes to be used to prepare a recycled plastic product, the processes of the arrangement being selected from the group consisting of preprocessing operations, size reduction operations, gravity concentration operations, color sorting, sorting by thickness, friction, or differential terminal velocity or drag in air, surface to mass control operations, separation processes enhanced by narrow surface to mass distributions, blending operations, and extrusion and compounding operations, the four or more processes being selected and arranged based on one or more properties of the plastic rich mixture to be separated and/or one or more desired properties of a recycled plastic material to be prepared from the waste plastic material.

2. A plastic recycling process, comprising:

subjecting a plastic-rich mixture to a sequence of processes selected from the group consisting of preprocessing operations, size reduction operations, gravity concentration operations, color sorting, sorting by thickness, friction, or differential terminal velocity or drag in air, surface to mass control operations, separation processes enhanced by narrow surface to mass distributions, blending operations, and extrusion and compounding operations; and

collecting a recycled plastic material as an output of the sequence of processes.

3. The process of claim 2, wherein:

the sequence of processes is defined based on one or more properties of the plastic-rich mixture and/or one or more desired properties of the recycled plastic material.

4. The process of either of claims 2 or 3, wherein:

subjecting the plastic-rich mixture to a sequence of processes includes separating the plastic-rich mixture into different grades of plastic material.

5. The process of any of claims 2-4, wherein:

subjecting the plastic-rich mixture to a sequence of processes includes separating the plastic-rich mixture into different types of plastic material.

6. The process of any of claims 2-5, further comprising:

selecting the plastic-rich mixture from a source selected from the group consisting of white goods, office automation equipment, consumer electronics, automotive shredder residue, packaging waste, household waste, building waste, industrial molding and extrusion scrap according to one or more desired properties of the recycled plastic material.

7. The process of any of claims 2-6, further comprising:

selecting the plastic-rich mixture based on a geographic location of origin of the plastic-rich mixture according to one or more desired properties of the recycled plastic material.

8. The process of any of claims 2-7, wherein:

one or more of the processes is repeated in the sequence of processes.

9. The process of any of claims 2-8, wherein:

subjecting the plastic-rich mixture to a sequence of processes includes blending two or more materials to obtain a desired property in the recycled plastic material.

10. The process of any of claims 2-9, wherein:

subjecting the plastic-rich mixture to a sequence of processes includes compounding the recycled plastic material with one or more additives.

11. The process method of any of claims 2-10, wherein:

collecting a recycled plastic material as an output of the sequence of processes includes collecting a plurality of recycled plastic materials.

12. The process of any of claims 2-11, wherein:

subjecting the plastic-rich mixture to a sequence of processes includes reducing the average size of plastic particles in the sequence of processes from about 75 mm to less than about 8 mm.

13. The process of claim 12, wherein:

the average size of plastic particles in the sequence of processes is reduced over a plurality of processes in the sequence of processes.

14. Apparatus for recycling waste plastic materials, the apparatus comprising three or
5 more devices configured to perform the process of any of claims 2-13.